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(54) **AQUEOUS EMULSION FOR PREVENTING AND TREATING HUANGLONGBING OF CITRUS FRUIT TREES AS WELL AS PREPARATION METHOD AND USAGE METHOD**

(57) Provided is an emulsion in water for preventing and treating a yellow shoot of a citrus fruit tree, and it is composed of the following components according to the weight ratio: 100-300 parts of a dodecanol, 2-150 parts of a hexadecanol, 1-100 parts of a bactericidal insecticide, 5-150 parts of a plant nutrient, 5-10 parts of an emulsifier, 4-6 parts of a co-emulsifier, 40 parts of a thickener, and 500-800 parts of water. Further provided are a preparation method for the above emulsion in water for preventing and treating the yellow shoot of the citrus fruit

tree, and an application method. The emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree, the preparation method and the application method provided by the present invention may achieve the following technical effects: the main propagation path of the citrus yellow shoot is cut off, the spread of the yellow shoot is prevented, pathogenic bacteria of the yellow shoot of the fruit tree are killed, and the vitality of a diseased tree is restored.

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Description**Technical Field**

5 **[0001]** The present invention relates to an emulsion in water for preventing and treating a yellow shoot of a citrus fruit tree, a preparation method and an application method.

Background

10 **[0002]** "Yellow shoot" of citrus fruit trees is one of destructive diseases in the citrus production in the world, and it is caused by gram-negative like bacteria (belonging to phloem bacilli) that parasitize in a phloem of the fruit tree. Seedlings and young trees die within 1-2 years after the onset of the disease, and adult trees lose the fruiting ability within 3-5 years after the onset of the disease.

15 **[0003]** The "yellow shoot" of the citrus fruit trees is widely distributed in nearly 50 countries and regions in the world. With the climate warming, the distribution area of vector insects of the yellow shoot is gradually expanded. At the same time, the world resource exchange is gradually frequent, so that the harm of the yellow shoot is increasingly serious. The occurrence of this disease leads to a large area of yield reduction, quality deterioration and even death, huge losses are brought to the citrus economy, and the healthy development of the citrus industry is seriously affected.

20 **[0004]** The yellow shoot may cause a systematic disease to the whole citrus plant, pathogens may be found in roots, trunks, branches, leaves, flowers and fruits, especially in the roots, a pesticide is very difficult to reach. Now, good method and way of administration are not found yet, and a specific pesticide is also not developed. At present, prevention and treatment methods mainly include a strict quarantine system, elimination of artificial propagation of diseased seedlings, cultivation of disease-free seedlings, microbial control, prevention and treatment of a pathogen propagation vector - citrus psylla and other methods. However, the use processes of these methods all have its own limitation factors, and there are loopholes in the prevention and treatment, so that the citrus yellow shoot occurs in large areas in different regions every year.

Summary

30 **[0005]** A technical problem to be solved by the present invention is to provide an emulsion in water for effectively preventing and treating a yellow shoot of a citrus fruit tree.

[0006] The present invention provides an emulsion in water for preventing and treating a yellow shoot of a citrus fruit tree, and it is composed of the following components according to the weight ratio: 100-300 parts of a dodecanol, 2-150 parts of a hexadecanol, 1-100 parts of a bactericidal insecticide, 5-150 parts of a plant nutrient, 5-10 parts of an emulsifier, 4-6 parts of a co-emulsifier, 40 parts of a thickener, and 500-800 parts of water.

35 **[0007]** Further, the emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree is composed of the following components according to the weight ratio: 150-250 parts of the dodecanol, 30-80 parts of the hexadecanol, 10-50 parts of the bactericidal insecticide, 20-80 parts of the plant nutrient, 5-10 parts of the emulsifier, 4-6 parts of the co-emulsifier, 40 parts of the thickener, and 500-800 parts of the water.

40 **[0008]** Further, the bactericidal insecticide is one or a mixture of more of a tea saponin, an azadirachtin, a toosendanin, a matrine, a celangulin and a stemonine.

[0009] Further, the plant nutrient is one or a mixture of two of an amino acid containing water-soluble fertilizer and a humic acid containing water-soluble fertilizer.

45 **[0010]** Further, the emulsifier is a non-ionic surfactant, and the non-ionic surfactant is one or a mixture of more of the tea saponin, a high-carbon fatty alcohol polyoxyethylene ether, a fatty acid polyoxyethylene ester and a dehydrated sorbitol ester.

[0011] Further, the co-emulsifier is an n-butanol or a propylene glycol.

[0012] Further, the thickener is one or a mixture of more of an arabic gum, a methyl cellulose, an xanthan gum, a white carbon black, an attapulgite and a bentonite.

50 **[0013]** The present invention further provides a preparation method for the above emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree, including the following steps: putting the dodecanol and the hexadecanol into a container and heating to melt at 60-70°C, then adding the emulsifier and the co-emulsifier into the container, treating by a high shear homogenizer at a rotation speed of 5000 revolutions per minute (rpm), rotating for 10 minutes, and adding 60-70°C of water into the container, treating by the high shear homogenizer at a rotation speed of 10000 rpm, rotating for 10 minutes, cooling to 40°C, then adding the thickener, the bactericidal insecticide, and the plant nutrient into the container, treating by the high shear homogenizer at the rotation speed of 10000 rpm, and rotating for 30-40 minutes, to obtain the emulsion in water.

[0014] The present invention further provides an application method of the above emulsion in water for preventing

and treating the yellow shoot of the citrus fruit tree, after the emulsion in water is diluted by 300 times with the water, it is sprayed on a whole fruit tree plant, and at the same time, the emulsion in water is sprayed on a root of the fruit tree after being diluted by 300 times.

[0015] Preferably, after the emulsion in water in which the plant nutrient is the amino acid containing water-soluble fertilizer is diluted by 300 times with the water, it is sprayed on the whole fruit tree plant; and after the emulsion in water in which the plant nutrient is the humic acid containing water-soluble fertilizer is diluted by 300 times with the water, it is sprayed on the root of the fruit tree.

[0016] The emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree, the preparation method and the application method provided by the present invention may be used to achieve the following technical effects: the main propagation path of the citrus yellow shoot is cut off, the spread of the yellow shoot is prevented, pathogenic bacteria of the yellow shoot of the fruit tree are killed, and the vitality of a diseased tree is restored. It is specifically achieved by the following ways: 1. The emulsion in water is prepared by the higher fatty alcohol, the bactericidal insecticide and the plant nutrient according to a certain process, this emulsion in water is sprayed on the fruit tree after being diluted by 300 times, a film may be formed on the surface of the whole fruit tree, and this film has good prevention and treatment effects on most fungal diseases, insect pests and eggs and the like, and may effectively kill citrus psylla, and cut off the main propagation path of the yellow shoot; and the bactericidal insecticide in the emulsion in water may kill the pathogenic bacteria of the yellow shoot in the plant, and the plant nutrient may supplement the nutrition of the plant, and restore the vitality of the plant; 2. This emulsion in water is sprayed on the root of fruit tree after being diluted by 300 times, a film may be formed on the surface of the root of the fruit tree and nearby soil particles, the pathogenic bacteria of the yellow shoot in the root may be effectively killed, and the plant nutrient may supplement the nutrition needed for the root recovery of the fruit tree, and accelerate the root recovery of the diseased tree.

Detailed Description of the Embodiments

Embodiment 1

[0017] This embodiment provides an emulsion in water for preventing and treating a yellow shoot of a citrus fruit tree, and it is composed of the following components according to the weight ratio: 200 parts of a dodecanol, 50 parts of a hexadecanol, 30 parts of a bactericidal insecticide, 40 parts of a plant nutrient, 6 parts of an emulsifier, 5 parts of a co-emulsifier, 40 parts of a thickener, and 700 parts of water.

[0018] In this embodiment, the bactericidal insecticide is a mixture of tea saponin and azadirachtin, herein the weight ratio of the tea saponin and the azadirachtin is 10:1. The plant nutrient is an amino acid containing water-soluble fertilizer, and the amino acid containing water-soluble fertilizer is a commercially available product. For example, in this embodiment, the amino acid containing water-soluble fertilizer produced by Zhuhai Runnong Science and Technology Co., Ltd. (agricultural fertilizer (2018) No. 12476) is used. The emulsifier is a fatty acid polyoxyethylene ester. The co-emulsifier is an n-butanol. The thickener is a methyl cellulose.

[0019] This embodiment further provides a preparation method for the emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree, including the following steps: putting the dodecanol and the hexadecanol into a container and heating to melt at 60°C, then adding the emulsifier and the co-emulsifier into the container, treating by a high shear homogenizer at a rotation speed of 5000 revolutions per minute (rpm), rotating for 10 minutes, and adding 60°C of water into the container, treating by the high shear homogenizer at a rotation speed of 10000 rpm, rotating for 10 minutes, cooling to 40°C, then adding the thickener, the bactericidal insecticide, and the plant nutrient into the container, treating by the high shear homogenizer at the rotation speed of 10000 rpm, and rotating for 30 minutes, to obtain the emulsion in water.

Embodiment 2

[0020] This embodiment provides an emulsion in water for preventing and treating a yellow shoot of a citrus fruit tree. Compared with Embodiment 1, a difference is that the plant nutrient is a humic acid containing water-soluble fertilizer, and the humic acid containing water-soluble fertilizer is a commercially available product. For example, the humic acid containing water-soluble fertilizer (agricultural fertilizer (2018) No. 7238) of Zhengzhou Haoda Biotech Co., Ltd. is used in this embodiment.

[0021] This embodiment provides an emulsion in water for preventing and treating a yellow shoot of a citrus fruit tree, and it is composed of the following components according to the weight ratio: 200 parts of a dodecanol, 50 parts of a hexadecanol, 30 parts of a bactericidal insecticide, 40 parts of a plant nutrient, 6 parts of an emulsifier, 5 parts of a co-emulsifier, 40 parts of a thickener, and 700 parts of water.

[0022] In this embodiment, the bactericidal insecticide is a mixture of tea saponin and azadirachtin, herein the weight ratio of the tea saponin and the azadirachtin is 10:1. The plant nutrient is a humic acid containing water-soluble fertilizer,

and the humic acid containing water-soluble fertilizer is a commercially available product. For example, in this embodiment, the humic acid containing water-soluble fertilizer (agricultural fertilizer (2018) No. 7238) of Zhengzhou Haoda Biotech Co., Ltd. is used. The emulsifier is a fatty acid polyoxyethylene ester. The co-emulsifier is an n-butanol. The thickener is a methyl cellulose.

[0023] A preparation method for the emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree in this embodiment is the same as that in Embodiment 1.

Embodiment 3

[0024] This embodiment provides an emulsion in water for preventing and treating a yellow shoot of a citrus fruit tree, and it is composed of the following components according to the weight ratio: 100 parts of a dodecanol, 2 parts of a hexadecanol, 1 part of a bactericidal insecticide, 5 parts of a plant nutrient, 5 parts of an emulsifier, 4 parts of a co-emulsifier, 40 parts of a thickener, and 500 parts of water.

[0025] The bactericidal insecticide in this embodiment is an azadirachtin. The plant nutrient is an amino acid containing water-soluble fertilizer, and the amino acid containing water-soluble fertilizer is a commercially available product. In this embodiment, the amino acid containing water-soluble fertilizer (agricultural fertilizer (2018) No. 12476) produced by Zhuhai Runnong Technology Co., Ltd. is used. The emulsifier is a high-carbon fatty alcohol polyoxyethylene ether. The co-emulsifier is a propylene glycol. The thickener is an attapulgate.

[0026] A preparation method for the emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree in this embodiment is the same as that in Embodiment 1.

Embodiment 4

[0027] This embodiment provides an emulsion in water for preventing and treating a yellow shoot of a citrus fruit tree, and it is composed of the following components according to the weight ratio: 300 parts of a dodecanol, 150 parts of a hexadecanol, 100 parts of a bactericidal insecticide, 150 parts of a plant nutrient, 10 parts of an emulsifier, 6 parts of a co-emulsifier, 40 parts of a thickener, and 800 parts of water.

[0028] The bactericidal insecticide in this embodiment is a tea saponin. The plant nutrient is an amino acid containing water-soluble fertilizer, and the amino acid containing water-soluble fertilizer is a commercially available product. In this embodiment, the amino acid containing water-soluble fertilizer (agricultural fertilizer (2018) No. 12476) produced by Zhuhai Runnong Technology Co., Ltd. is used. The emulsifier is a high-carbon fatty alcohol polyoxyethylene ether. The co-emulsifier is a propylene glycol. The thickener is a methyl cellulose.

[0029] A preparation method for the emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree in this embodiment is the same as that in Embodiment 1.

Embodiment 5

[0030] This embodiment provides an application method of the emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree. While the emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree prepared in Embodiments 1, 2, 3 or 4 of the present invention is used, the emulsion in water is sprayed on a whole fruit tree (including leaves and trunks) after being diluted by 300 times with water, and the emulsion in water is sprayed on a root of the fruit tree after being diluted by 300 times.

Embodiment 6

[0031] As a preferred implementation mode of Embodiment 5, the emulsion in water in which the plant nutrient is the amino acid containing water-soluble fertilizer is sprayed on the whole fruit tree (including leaves and trunks) after being diluted by 300 times with water; and the emulsion in water in which the plant nutrient is the humic acid containing water-soluble fertilizer is sprayed on the root of the fruit tree after being diluted by 300 times with the water.

Embodiment 7

[0032] Prevention and treatment test effect of emulsion in water for preventing and treating yellow shoot of citrus fruit tree on Xinhui Chazhi citrus fruit tree

[0033] Sampling:

Sample A is the emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree prepared in Embodiment 1.

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Sample B is the emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree prepared in Embodiment 2.

Sample C is the emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree prepared in Embodiment 3.

Sample D is the emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree prepared in Embodiment 4.

Sample E is abamectin-imidacloprid (manufacturer: Shanghai Nongle Biological Products Co., Ltd. (registration number: PD20141229))

Crop: Xinhui Chazhi citrus

Place: Panli Village, Shuangshui Town, Xinhui District, Jiangmen City, Guangdong Province

Method: 50 Chazhi citrus fruit trees are selected from the same area in a fruit farm, and according to the requirements of an experimental scheme, the fruit trees are treated with root spraying and plant spraying, and the treatment is performed once every 15 days.

Table 1: Experimental scheme for preventing and treating yellow shoot of citrus fruit tree

Serial number	Used sample	Application method
Experimental group 1	Samples A and B	1. Sample A is sprayed on a plant (including leaves and branches) after being diluted by 300 times with water; 2. Sample B is sprayed on a root of a fruit tree after being diluted by 300 times with the water.
Experimental group 2	Sample A	Sample A is only sprayed on the plant (including leaves and branches) after being diluted by 300 times with the water.
Experimental group 3	Sample A	Sample A is sprayed on the plant (including leaves and branches) after being diluted by 300 times with the water, and sprayed on the root of the fruit tree at the same time.
Experimental group 4	Sample B	Sample B is only sprayed on the plant (including leaves and branches) after being diluted by 300 times with the water.
Experimental group 5	Sample B	Sample B is sprayed on the plant (including leaves and branches) after being diluted by 300 times with the water, and sprayed on the root of the fruit tree at the same time.
Experimental group 6	Sample C	Sample C is only sprayed on the plant (including leaves and branches) after being diluted by 300 times with the water.
Experimental group 7	Sample C	Sample C is sprayed on the plant (including leaves and branches) after being diluted by 300 times with the water, and sprayed on the root of the fruit tree at the same time.
Experimental group 8	Sample D	Sample D is only sprayed on the plant (including leaves and branches) after being diluted by 300 times with the water.
Experimental group 9	Sample D	Sample D is sprayed on the plant (including leaves and branches) after being diluted by 300 times with the water, and sprayed on the root of the fruit tree at the same time.
Control group	Sample E	Sample E is sprayed on the plant (including leaves and branches) after being diluted (the dilution ratio is in accordance with the use requirements of Sample E) with the water.

1. The effects of preventing and treating the yellow shoot are observed on the site, including the spread effect of preventing and treating the yellow shoot (the effect of preventing and treating citrus psylla) and the treatment effect of a diseased tree with the yellow shoot, results are as follows.

Table 2: Prevention and treatment effect of emulsion in water for preventing and treating yellow shoot of citrus fruit tree on Xinhui Chazhi citrus

Serial number	Prevention and treatment effect of citrus psylla (%)	Treatment Effect of yellow shoot diseased tree
Experimental group 1	92.3	The diseased tree is rejuvenated, the branches are no longer dry, the leaves turn green slowly (except for the original yellow leaves fallen), and 97% of the new grown leaves are normal.
Experimental group 2	91.1	The disease of the diseased tree is no longer worsen, some of the branches are no longer dry, some of the leaves turn green slowly, and 75% of the new grown leaves are normal.
Experimental group 3	90.1	The disease of the diseased tree is no longer worsen, some of the branches are no longer dry, some of the leaves turn green slowly, and 89% of the new grown leaves are normal.
Experimental group 4	93.3	The disease of the diseased tree is no longer worsen, some of the branches are no longer dry, some of the leaves turn green slowly, and 74% of the new grown leaves are normal.
Experimental group 5	91.1	The disease of the diseased tree is no longer worsen, some of the branches are no longer dry, some of the leaves turn green slowly, and 92% of the new grown leaves are normal.
Experimental group 6	88.1	The disease of the diseased tree is no longer worsen, some of the branches are no longer dry, some of the leaves turn green slowly, and 78% of the new grown leaves are normal.
Experimental group 7	93.5	The disease of the diseased tree is no longer worsen, some of the branches are no longer dry, some of the leaves turn green slowly, and 90.2% of the new grown leaves are normal.
Experimental group 8	91.3	The disease of the diseased tree is no longer worsen, some of the branches are no longer dry, some of the leaves turn green slowly, and 83% of the new grown leaves are normal.
Experimental group 9	89.1	The disease of the diseased tree is no longer worsen, some of the branches are no longer dry, some of the leaves turn green slowly, and 91% of the new grown leaves are normal.
Control group	64.8	The diseased tree is weaker and weaker, there are more and more dry branches and yellow leaves, and 90% of the new leaves have the diseases.

[0034] A computational formula for the prevention and treatment effect of the citrus psylla is as follows.

$$PT = (1 - \frac{CK_0 \times PT_1}{CK_1 \times PT_0}) \times 100$$

PT -Prevention and treatment effect, the unit is a percentage (%);

PT_0 -Number of insects in pesticide treatment area before application, the unit is a head;

PT_1 -Number of insects in pesticide treatment area after application, the unit is a head;

CK_0 -Number of live insects in blank control area before application, the unit is a head; and

CK_1 -Number of live insects in blank control area after application, the unit is a head.

[0035] It may be seen from Table 2 that while the emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree of the present invention is used to spray on the fruit tree plants, each experimental group has the apparent prevention and treatment effect on the citrus psylla, the propagation path of the yellow shoot is cut off effectively, and the spread of the yellow shoot is reduced. The prevention and treatment effect on the citrus psylla in the experimental group is apparently better than that in the control group using a traditional pesticide; and it is seen from the treatment results of the yellow shoot diseased tree that the root spraying and the plant spraying (performed alone or simultaneously) on the fruit tree may both treat the yellow shoot of the Xinhui Chazhi citrus. After the treatment, the fruit tree recovers the vitality, and the disease gradually disappears. The prevention and treatment effect of the experimental group in which the root spraying and the plant spraying are performed simultaneously is better than that of the experimental group in which the spraying is performed alone, and also significantly better than that of the control group using the traditional pesticide, herein the prevention and treatment effect of Experimental group 1 in which the root spraying and the plant spraying are performed by using different formulations is the best.

[0036] 2. Samples of diseased tree branches and leaves of Experimental group 1 and control group in different periods are collected on the site, the positive reaction conditions of the samples to phloem bacilli of Asian yellow shoot are analyzed by a nucleic acid molecular detection method (a qualitative test is used for the samples from 2019-2-2, and a quantitative test is used for the samples from other times), to determine the prevention and treatment effect, and results are as follows.

Table 3: Pathogenic bacteria detection results of samples of fruit trees in different periods in Experimental group 1

Serial number	Sample place	Sampling fruit tree number	Sample number	Sampling time: 2019-12-2	Sampling time: 2020-01-26		Sampling time: 2020-02-23		Sampling time: 2020-03-15		
				Result	Result	Ct value	Result	Ct value	Result	Ct value	
1	1# base	1#	1-1-1 (Old branches and new leaves)	Positive	--	38.99	--	38.47	--	38.91	
2		1#	1-1-2 (Old branches and old leaves)	Positive	Positive	28.46	Positive	33.64	--	36.86	
4		2#	1-2-1 (Old branches and new leaves)	Positive	--	38.37	--	37.42	--	37.21	
5		2#	1-2-2 (Old branches and old leaves)	Positive	--	37.77	--	37.22	--	38.1	
6		3#	1-3 (Old branches and old leaves)	Positive	Positive	Positive	31.72	Positive	33.56	Positive	35.29
7	2# base	4#	1-4 (Old branches and new leaves)	Positive	--	36.21	--	37.52	--	37.78	
8		1#	2-1 (Old branches and old leaves)	Positive	Positive	Positive	34.33	Positive	35.06	--	37.52
9	2# base	2#	2-2 (Old branches and old leaves)	Positive	Positive	Positive	Positive	35.46	Positive	35.93	
10		3#	2-3 (Old branches and old leaves)	Positive	--	37.24	--	37.56	--	38.22	
Note: Judgment standard: Ct value<36, the fruit tree sample has a positive reaction to the pathogenic bacteria of the yellow shoot, the numerical value is smaller, and the disease is more serious.											

Table 4: Pathogenic bacteria detection results of samples of fruit trees in different periods in control group 1

Serial number	Sample place	Sampling fruit tree number	Sample number	Sampling time: 2019-12-2		Sampling time: 2020-01-26		Sampling time: 2020-02-23		Sampling time: 2020-03-15	
				Result		Result	Ct value	Result	Ct value	Result	Ct value
1	1# base	5#	5-1-1 (Old branches and new leaves)	Positive		Positive	35.61	Positive	35.4 5	Positive	35.10
2		5#	5-1-2(Old branches and old leaves)	Positive		Positive	32.12	Positive	26.55	Positive	26.44
3		6#	6-1 (Old branches and new leaves)	Positive		Positive	35.01	Positive	34.37	Positive	33.58
Note: Judgment standard: Ct value<36, the fruit tree sample has a positive reaction to the pathogenic bacteria of the yellow shoot, the numerical value is smaller, and the disease is more serious.											

[0037] It may be seen from Table 3 that the reaction of the fruit trees to the bacilli of Asian yellow shoot in Experiment group 1 in which the root spraying and the spraying are performed simultaneously: as time goes on, the proportion of the positive reaction in the old branches and leaves is continuously decreased, and the Ct value is also continuously increased, approaches or exceeds a threshold value, it is indicated that the pathogenic bacteria in the old branches and leaves of the original diseased tree are slowly decreased, and the fruit tree turns to normal slowly; and after the treatment, the pathogenic bacteria are not detected in branch and leaf portions with new grown leaves (including old branches and new leaves), it is indicated that there are no bacteria in the roots, trunks and branches with the new grown leaves of the fruit tree. The fruit tree recovers the vitality, and belongs to the normal fruit tree.

[0038] It may be seen from Table 4 that the fruit trees in the control group with the conventional treatment always show the positive reaction to the pathogenic bacteria detection of the yellow shoot, and the Ct value has a downward trend, it is indicated that there are more and more pathogenic bacteria of the yellow shoot, and the disease of the fruit tree is more and more serious.

[0039] It may be seen from the above that the emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree provided in this embodiment may effectively prevent and treat the citrus yellow shoot, herein it is the best scheme to use the different formulations (Experimental group 1) to perform the root spraying and the plant spraying on the fruit tree simultaneously.

[0040] The above are only preferred embodiments of the present invention, and are not intended to limit the present invention. For those skilled in the art, the present invention may have various changes and variations. Any modifications, equivalent replacements, improvements and the like made within the spirit and principle of the present invention shall be included in the scope of protection of the present invention.

Claims

1. An emulsion in water for preventing and treating a yellow shoot of a citrus fruit tree, wherein it is composed of the following components according to the weight ratio: 100-300 parts of a dodecanol, 2-150 parts of a hexadecanol, 1-100 parts of a bactericidal insecticide, 5-150 parts of a plant nutrient, 5-10 parts of an emulsifier, 4-6 parts of a co-emulsifier, 40 parts of a thickener, and 500-800 parts of water.
2. The emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree according to claim 1, wherein it is composed of the following components according to the weight ratio: 150-250 parts of the dodecanol, 30-80 parts of the hexadecanol, 10-50 parts of the bactericidal insecticide, 20-80 parts of the plant nutrient, 5-10 parts of the emulsifier, 4-6 parts of the co-emulsifier, 40 parts of the thickener, and 500-800 parts of the water.
3. The emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree according to claim 1 or 2, wherein the bactericidal insecticide is one or a mixture of more of a tea saponin, an azadirachtin, a toosendanin, a matrine, a celangulin and a stemonine.
4. The emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree according to claim 3, wherein the plant nutrient is one or a mixture of two of an amino acid containing water-soluble fertilizer and a humic acid containing water-soluble fertilizer.
5. The emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree according to claim 3, wherein the emulsifier is a non-ionic surfactant, and the non-ionic surfactant is one or a mixture of more of the tea saponin, a high-carbon fatty alcohol polyoxyethylene ether, a fatty acid polyoxyethylene ester and a dehydrated sorbitol ester.
6. The emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree according to claim 3, wherein the co-emulsifier is an n-butanol or a propylene glycol.
7. The emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree according to claim 3, wherein the thickener is one or a mixture of more of an arabic gum, a methyl cellulose, an xanthan gum, a white carbon black, an attapulgite and a bentonite.
8. A preparation method for the emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree according to claim 1 or 2, comprising the following steps: putting the dodecanol and the hexadecanol into a container and heating to melt at 60-70°C, then adding the emulsifier and the co-emulsifier into the container, treating by a high shear homogenizer at a rotation speed of 5000 revolutions per minute (rpm), rotating for 10 minutes, and adding 60-70°C of water into the container, treating by the high shear homogenizer at a rotation speed of 10000 rpm,

rotating for 10 minutes, cooling to 40°C, then adding the thickener, the bactericidal insecticide, and the plant nutrient into the container, treating by the high shear homogenizer at the rotation speed of 10000 rpm, and rotating for 30-40 minutes, to obtain the emulsion in water.

- 5 **9.** An application method of the emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree according to claim 1 or 2, wherein after the emulsion in water is diluted by 300 times with the water, it is sprayed on a whole fruit tree plant, and at the same time, the emulsion in water is sprayed on a root of the fruit tree after being diluted by 300 times.
- 10 **10.** An application method of the emulsion in water for preventing and treating the yellow shoot of the citrus fruit tree according to claim 1 or 2, wherein after the emulsion in water in which the plant nutrient is the amino acid containing water-soluble fertilizer is diluted by 300 times with the water, it is sprayed on the whole fruit tree plant; and after the emulsion in water in which the plant nutrient is the humic acid containing water-soluble fertilizer is diluted by 300 times with the water, it is sprayed on the root of the fruit tree.
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2020/089891

A. CLASSIFICATION OF SUBJECT MATTER A01G 17/00(2006.01)i; A01G 13/00(2006.01)i; A01N 25/04(2006.01)i According to International Patent Classification (IPC) or to both national classification and IPC															
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) A01G 13; A01G 17; A01N; A01P; C05G Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) CNABS, CNTXT, VEN, CNKI: 柑, 橘, 十二醇, 黄龙病, 十六醇, 乳化剂, 助乳化剂, 增稠剂, 杀菌, 杀虫, citrus, huanglongbing, dodecanol, cetyl, alcohol, bactericidal, insecticide, emulsifier, co-emulsifier, thickener															
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>CN 109924057 A (ZHUHAI RUNNONG TECHNOLOGY CO., LTD.) 25 June 2019 (2019-06-25) description, paragraphs [0016]-[0030]</td> <td>1-10</td> </tr> <tr> <td>Y</td> <td>CN 104823626 A (YANG, Zhengting et al.) 12 August 2015 (2015-08-12) description, paragraphs [0027]-[0092]</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>CN 109769550 A (ZHUHAI RUNNONG TECHNOLOGY CO., LTD.) 21 May 2019 (2019-05-21) entire document</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>CN 109769538 A (ZHUHAI RUNNONG TECHNOLOGY CO., LTD.) 21 May 2019 (2019-05-21) entire document</td> <td>1-10</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	Y	CN 109924057 A (ZHUHAI RUNNONG TECHNOLOGY CO., LTD.) 25 June 2019 (2019-06-25) description, paragraphs [0016]-[0030]	1-10	Y	CN 104823626 A (YANG, Zhengting et al.) 12 August 2015 (2015-08-12) description, paragraphs [0027]-[0092]	1-10	A	CN 109769550 A (ZHUHAI RUNNONG TECHNOLOGY CO., LTD.) 21 May 2019 (2019-05-21) entire document	1-10	A	CN 109769538 A (ZHUHAI RUNNONG TECHNOLOGY CO., LTD.) 21 May 2019 (2019-05-21) entire document	1-10
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.															
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Date of the actual completion of the international search 17 November 2020	Date of mailing of the international search report 01 December 2020														
Name and mailing address of the ISA/CN China National Intellectual Property Administration (ISA/CN) No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088 China Facsimile No. (86-10)62019451	Authorized officer Telephone No.														

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2020/089891

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN	109924057	A	25 June 2019	None	
CN	104823626	A	12 August 2015	CN 104823626 B	18 July 2017
CN	109769550	A	21 May 2019	None	
CN	109769538	A	21 May 2019	None	

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